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RESEARCH ARTICLE

Chewing lice (Phthiraptera, Amblycera, Ischnocera) from shorebirds (Aves, Charadriiformes) in the Kızılırmak Delta, Turkey

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Abstract

This study was carried out in the Kızılırmak Delta Cernek Bird Ringing Station, Central Black Sea Region, during August and September 2020, to survey the louse species found on shorebirds (Aves: Charadriiformes). A total of 241 birds belonging to 13 species were searched for chewing lice. Eleven species in six genera of the family Scolopacidae (*Actitis hypoleucos, Arenaria interpres, Calidris alba, Calidris alpina, Calidris falcinellus, Calidris ferruginea, Calidris minuta, Gallinago gallinago, Tringa glareola, Tringa totanus*, *Xenus cinereus*) and two species in one genus of the family Charadriidae (*Charadrius dubius*, *Charadrius hiaticula*) were examined. Birds were caught alive with mist-nets, ringed, searched for lice, and released. A total of 153 birds (63.49%) were infested with lice belonging to 16 species, five amblycerans: *Actornithophilus bicolor, Actornithophilus ochraceus, Actornithophilus totani, Actornithophilus umbrinus, Austromenopon lutescens*, and eleven ischnocerans: *Carduiceps fulvofasciatus, Carduiceps meinertzhageni, Carduiceps zonarius, Lunaceps actophilus, Lunaceps falcinellus, Lunaceps schismatus, Quadraceps hiaticulae, Quadraceps obscurus, Quadraceps ravus, Quadraceps strepsilaris* and *Saemundssonia platygaster frater*. These eight species are new records for Turkey: *Ac. bicolor, Ac. ochraceus, Ca. fulvofasciatus, Lu. falcinellus, Lu. schismatus, Qu. ravus, Qu. strepsilaris* and *Sa. platygaster frater*. In addition, *Qudraceps hiaticulae* was recorded from Little ringed plovers (*Charadrius dubius*)

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for the first time in the world in this study. According the lice checklist of wild birds in Turkey, a total of 188 bird species examined and 122 of them were infested, and a total of 217 chewing lice species has been recorded.

Keywords
Bird ringing, Charadriiformes, chewing lice, hosts, infestation, shorebirds, checklist.

Introduction

The order Charadriiformes includes 387 species belonging to 88 genera from 19 families (Gill et al. 2020), with a wide range of vernacular names such as, e.g. shorebirds, plovers, jacanas, gulls, auks. They are a cosmopolitan group of small to medium sized birds living close to water, the seashore, rivers and marshes, with many species being long distance migrants. Their diet consists mainly of invertebrates and small vertebrates (Snow and Perrins 1998). In Turkey, a total of 87 species of Charadriiformes have been recorded (Karataş et al. 2020).

About 4000 species of bird lice have been described so far. They are host-specific and their geographical distribution coincides with the distribution of their hosts (Price et al. 2003). Studies on lice from birds are especially descriptive (Valim et al. 2009), while recent studies focus on species richness, abundance, and prevalence (Tavera et al. 2019).

The louse fauna living on charadriiform birds in Turkey has not been properly studied. In a survey performed in Lake Kuyucuk, 41 birds belonging to seven charadriiform species were searched for lice, and 18 species were recorded (Dik et al. 2010). In other louse studies in Turkey, usually few bird species and/or specimens were examined (Açıcı et al. 2011, Dik et al. 2011a, 2011b, 2015, 2017a, 2017b, Dik and Uslu 2008, Girişgin et al. 2013, Orunç Kılıç et al. 2013, Göz et al. 2015). Until now, only 21 charadriiform bird species were examined for lice in Turkey, representing a 24.2 % of the total fauna, with seventeen of them infested with only one louse species.

The aim of this study was to increase knowledge of the louse fauna found on some charadriiform species in Turkey. The following 13 species were searched for lice: Common sandpiper, *Actitis hypoleucos* (Linnaeus, 1758); Ruddy turnstone, *Arenaria interpres* (Linnaeus, 1758); Sanderling, *Calidris alba* (Pallas, 1764); Dunlin, *Calidris alpina* (Linnaeus, 1758); Broad-billed sandpiper, *Calidris falcinellus* (Pontoppidan, 1763); Curlew sandpiper, *Calidris ferruginea* (Pontoppidan, 1763); Little stint, *Calidris minuta* (Leisler, 1812); Common snipe, *Gallinago gallinago* (Linnaeus, 1758); Wood sandpiper, *Tringa glareola* (Linnaeus, 1758); Common redshank, *Tringa totanus* (Linnaeus, 1758); Terek sandpiper, *Xenus cinereus* (Güldenstädt, 1775); Little ringed plover *Charadrius dubius* Scopoli, 1786; Common ringed plover, *Charadrius hiaticula* Linnaeus, 1758.

Materials and Methods

This survey was performed at the Cernek Ringing Station (41°38'35" N; 36°05'02" E (DMS)) in the Kızılırmak Delta of the Central Black Sea region of Turkey. In 2020, the water level at the Cernek Lake in the Kızılırmak Delta markedly dropped and some small islands appeared close to the shoreline, where many charadriiform birds were present. The ringing team at the Cernek Ringing Station, which especially aims to study migratory passerines, set up three 7-meter mist-nets with 4 shelves and 16 × 16 mm mesh size on these islands from 25 August until 27 September 2020. The height of the mist-nets were 2.5 meters. The mist-nets stayed open from sunrise to sunset every day, and were replaced the same day when destroyed by water buffaloes. The birds caught were extracted from the mist-nets and each bird carried in separate holding bags to the ringing station. The birds were identified, aged and sexed according to Baker (2016), Demongin (2016), and Prater et al. (1977), as well as according to the experience of the ringers. Sampling and ringing birds was performed under the permission of the Ministry of Agriculture and Forestry, General Directorate of Nature Conservation and National Parks (protocol number 72784983-488.04-241348), and ethical permits approved by Ondokuz Mayıs University Animal Ethical Committee (ethical number B.30.2.ODM.0.20.09.00-050.04-96). Gill et al. (2020) has been followed for bird taxonomy and nomenclature.

A total of 241 birds belonging to 13 species, six genera, and two families (Scolopacidae and Charadriidae) were searched for chewing lice. After ringing, each bird was examined by visual examination for the presence of lice by blowing the feathers. All the lice seen on each bird were collected with forceps and stored in 70% alcohol in a plastic vial. A label with the species code, date and ring number was added to each vial, and transported to the parasitology laboratory of the Veterinary Faculty at Selçuk University for further treatment and identification of the louse species.

At the laboratory, the lice were cleared in 10% potassium hydroxide (KOH) for 24 hours, rinsed out in distilled water for 24 hours, then kept in 70% and 99% alcohol serials for 24 hours for dehydration and in saturated alcohol-phenol for a few minutes. Later, they were mounted in Canada balsam on slides. The slides were dried in an incubator at 50–60° C for 2–3 weeks. To avoid transmission of lice to other hosts, hands, bench and the equipment has been cleaned after each treatment. Lice were examined, and photos taken with a camera Leica DM 750 mounted on a trinocular phase-contrast microscope, with a Leica DFC295 application unit, and identified to species using the following references: Clay (1959; 1962; 1969), Clay and Hopkins (1954), Dik et al. (Dik et al., 2010; 2011a; 2011b; 2015; 2017a; 2017b), Dik and Uslu (2008), Gustafsson and Olsson (2012, 2017), Gustafsson et al. (2018), Timmermann (1949; 1950; 1951a; 1951b; 1952; 1953; 1954a; 1954b; 1957; 1969).

While preparing the checklist of lice fauna of wild birds of Turkey, all available peer reviewed articles, grey literature as well as MsC and PhD thesis were searched in Turkish and English using the search terms "lice fauna Turkey", "bird ectoparasites", "chewing lice", "Phtiraptera", Ischnocera", "Amblycera". The bird species treated as

pets, studied at zoo, domestic poultry have not been included to the recent checklist of lice fauna of wild birds in Turkey.

Results

From a total of 241 birds examined, 153 (63.49%) were found to be infested with chewing lice (Table 1). Dunlin (*Calidris alpina),* Little stint (*Calidris minuta)* and Curlew sandpiper (*Calidris ferruginea*) were the most abundant bird species ringed, while the Common redshank (*Tringa totanus)*, the Terek sandpiper (*Xenus cinereus)* and the Little ringed plover (*Charadrius dubius)* were represented by only one bird. Prevalence was highest in Dunlins (*Calidris alpina*) (84.35%), and followed by Common sandpipers (*Actitis hypoleucos)* (71.43%) and Broad-billed sandpipers (*Calidris falcinellus)* (71.43%). No louse was found on Common snipes (*Gallinago gallinago)*, the Common redshank (*Tringa totanus)* and the Terek sandpiper (*Xenus cinereus)*. The examined shorebirds were co-infested with more than one louse species. The highest prevalence of louse species was detected in *Quadraceps hiaticulae* found on *Charadrius dubius*, and followed by *Lunaceps schismatus* found on *Calidris alpina*.

Sixteen species of lice were collected and identified, as follows: *Actornithophilus bicolor* (Piaget, 1880) (Fig. 1A), *Actornithophilus ochraceus* (Nitzsch, 1818) (Fig. 1B), *Actornithophilus totani* (Schrank, 1803) (Fig. 1C), *Actornithophilus umbrinus* (Burmeister, 1838) (Fig. 1D), *Austromenopon lutescens* (Burmeister, 1838) (Fig. 2A), *Carduiceps fulvofasciatus* (Grube, 1851) (Fig. 2B), *Carduiceps meinertzhageni* Timmermann, 1954 (Fig. 2C), *Carduiceps zonarius* (Nitzsch, 1866) (Fig. 2D), *Lunaceps actophilus* (Kellogg & Chapman, 1899) (Fig. 3A), *Lunaceps falcinellus* Timmermann, 1954 (Fig. 3B), *Lunaceps schismatus* Gustafsson & Olsson, 2012 (Fig. 3C), *Quadraceps hiaticulae* (O. Fabricius, 1780) (Fig. 3D), *Quadraceps obscurus* (Burmeister, 1838) (Fig. 4A), *Quadraceps ravus* (Kellogg, 1899) (Fig. 4B), *Quadraceps strepsilaris* (Denny, 1842) (Fig. 4C) and *Saemundssonia platygaster frater* (Giebel, 1874) (Fig. 4D). In total, 1066 lice (554♀, 444♂ and 68 nymphs) were collected, with a range of 1–24 lice per infested bird. Mean intensity was 6.95. The highest numbers of lice per bird were recorded on *Calidris alpina* (24 individuals), *Arenaria interpres* (21 individuals), *Calidris alba* (20 individuals), and *Calidris minuta* (13 individuals).

Lunaceps was the commonest genus found on the birds, and it was found on 123 out of 136 (90.44%) infested birds in the family Scolapacidae; 494 *L. schismatus* were collected from 69 out of 70 *Calidris falcinellus*, and two were collected from one out of five *Actitis hypoleucos*. Two *L. actophilus* were collected from two out of three *Calidris alba*. 33 *L. falcinellus* were found on 35 out of 70 *Calidris minuta*. 12 *L. falcinellus* were found on 18 out of 30 *Calidris ferruginea*. Nine *L. falcinellus* were found on four out of five *Calidris falcinellus*. Two *L. falcinellus* were found on five out of seven *Actitis hypolucos*. On one *Actitis hypoleucos L. falcinellus* and *L. schismatus* were detected together (Table 1). The second common genus was *Carduiceps*, and it was found on 34 out of 95 (35.78%) infested birds in the family Scolapacidae. Three *Carduiceps* species

Table 1. Bird species examined for lice in this study, and prevalence for each bird and lice species. Abbreviations: NE = number of hosts examined; NI (P) = number of hosts infested (prevalence); NI-L (P) = number of hosts infested by each louse species (prevalence)

Bird family	Bird species	NE	NI (P)	Louse species	NI-L (P)
Scolopacidae	*Actitis hypoleucos*	7	5 (71.43%)	*Actornitophilus* spp.	1 (14.29%)
				Lunaceps falcinellus	2 (28.57%)
				Lunaceps schismatus	1 (14.29%)
				Quadraceps ravus	4 (5.19%)
				Saemundssonia platygaster frater	3 (42.86%)
	Arenaria interpres	12	7 (58.33%)	*Actornitophilus bicolor*	5 (41.67%)
				Austromenopon lutescens	2 (16.67%)
				Carduiceps spp.	1 (8.33%)
				Quadraceps strepsilaris	7 (58.33%)
	Calidris alba	5	3 (60.0%)	*Actornitophilus umbrinus*	1 (20.00%)
				Carduiceps zonarius	1 (20.00%)
				Lunaceps actophilus	2 (40.00%)
	Calidris alpina	83	70 (84.34%)	*Carduiceps meinertzhagani*	14 (16.87%)
				Lunaceps schismatus	69 (83.13%)
				Quadraceps hiaticulae	1 (1.20%)
	Calidris falcinellus	7	5 (71.43%)	*Carduiceps fulvofasciatus*	2 (28.57%)
				Lunaceps falcinellus	4 (57.14%)
	Calidris ferruginea	30	18 (60.00%)	*Actornitophilus umbrinus*	12 (40.00%)
				Carduiceps zonarius	9 (30.00%)
				Lunaceps falcinellus	12 (40.00%)
	Calidris minuta	70	35 (50.00%)	*Austromenopon* spp.	1 (1.43%)
				Carduiceps zonarius	7 (10.00%)
				Lunaceps falcinellus	33 (47.14%)
	Tringa glareola	5	2 (40.00%)	*Actornitophilus totani*	2 (40.00%)
				Quadraceps obscurus	2 (40.00%)
Charadriidae	*Charadrius dubius*	1	1 (100.00%)	*Quadraceps hiaticulae*	1 (100.00%)
	Charadrius hiaticula	15	7 (46.67%)	*Actornitophilus ochraceus*	5 (33.33%)
				Quadraceps hiaticulae	5 (33.33%)
				Quadraceps spp.	1 (6.67%)
		241	**153 (63.49%)**		

were extracted from six bird species (*Arenaria interpres, Calidris alba, Calidris alpina, Calidris falcinellus, Calidris ferruginea. Caldris minuta*), where *C. meinertzhagani* has the highest prevalence. Four species of *Actornitophilus* were found on 26 out of 47 (55.32%) infested birds of six bird species (*Actitis hypoleucos, Arenaria interpres, Calidris alba, Calidris ferruginea, Tringa glareola, Charadrius hiaticula*). Four species of *Quadraceps* were found on 21 out of 92 (22.82%) infested birds of six bird species (*Actitis hypoleucos, Arenaria interpres, Calidris aipina, Tringa glareola, Charadrius*

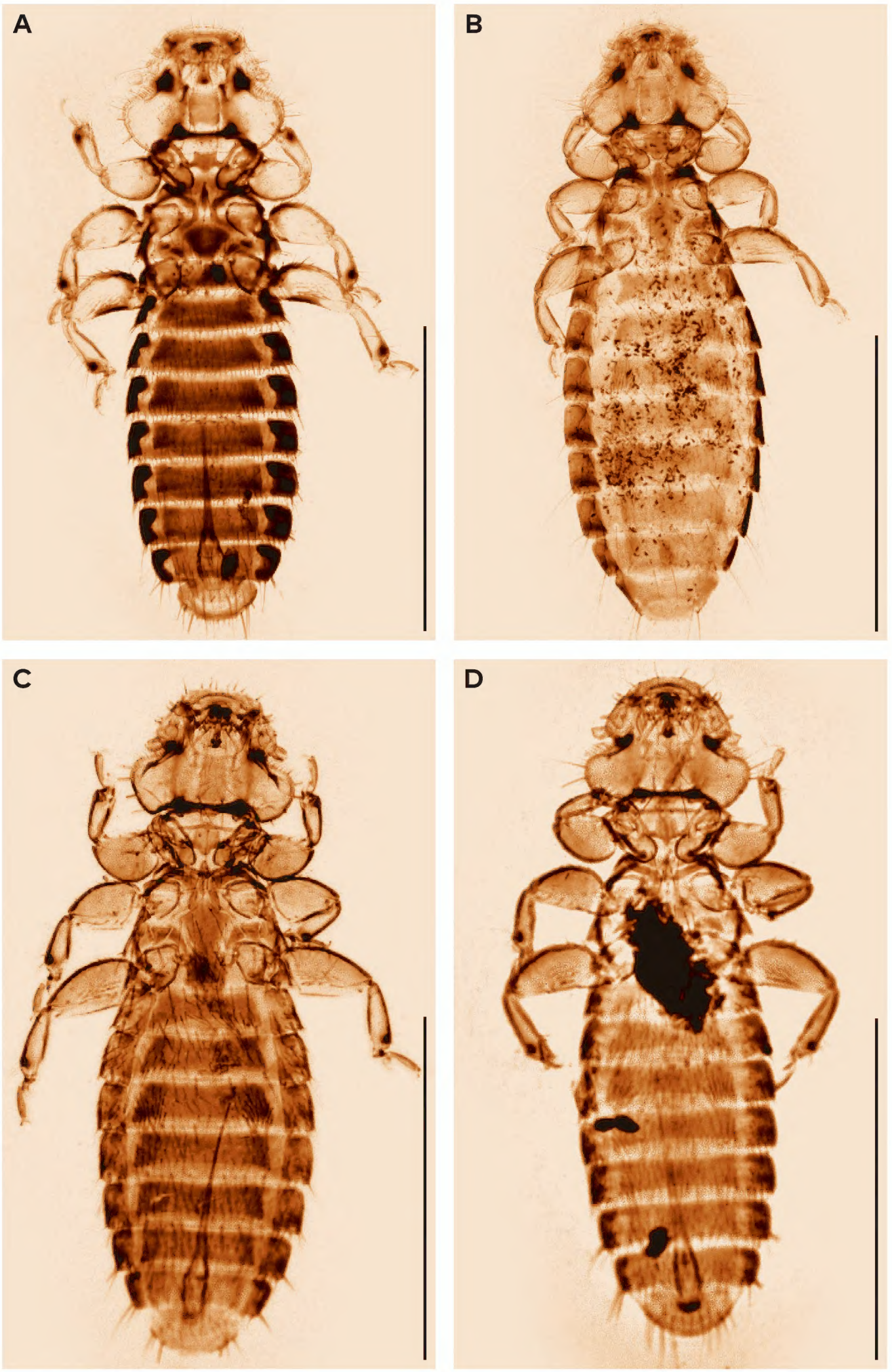

Figure 1. A *Actornithophilus bicolor*, male, from *Arenaria interpres,* original; **B** *Actornithophilus ochraceus*, female, from *Charadrius hiaticula*, original; **C** *Actornithophilus totani*, male, from *Tringa glareola*, original; **D** *Actornithophilus umbrinus*, male, from *Calidris ferruginea*, original. Scale bar = 1000 μm.

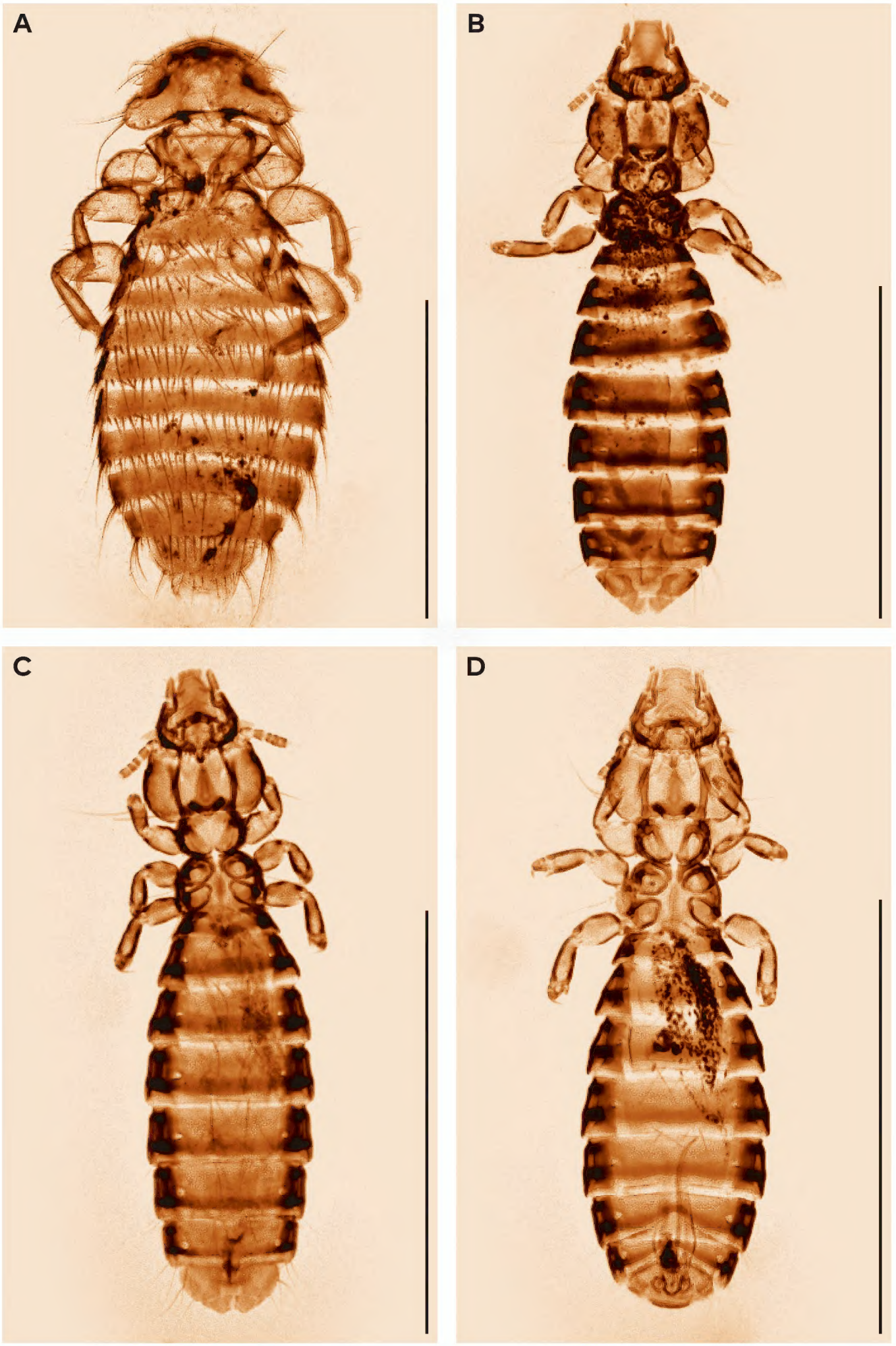

Figure 2. A *Austromenopon lutescens*, female, from *Arenaria interpres*, original; **B** *Carduiceps fulvofasciatus*, female, from *Calidris falcinellus,* original; **C** *Carduiceps meinertzhageni*, female, from *Calidris alpina,* original; **D** *Carduiceps zonarius*, male, from *Calidris ferruginea,* original. Scale bar = 1000 μm.

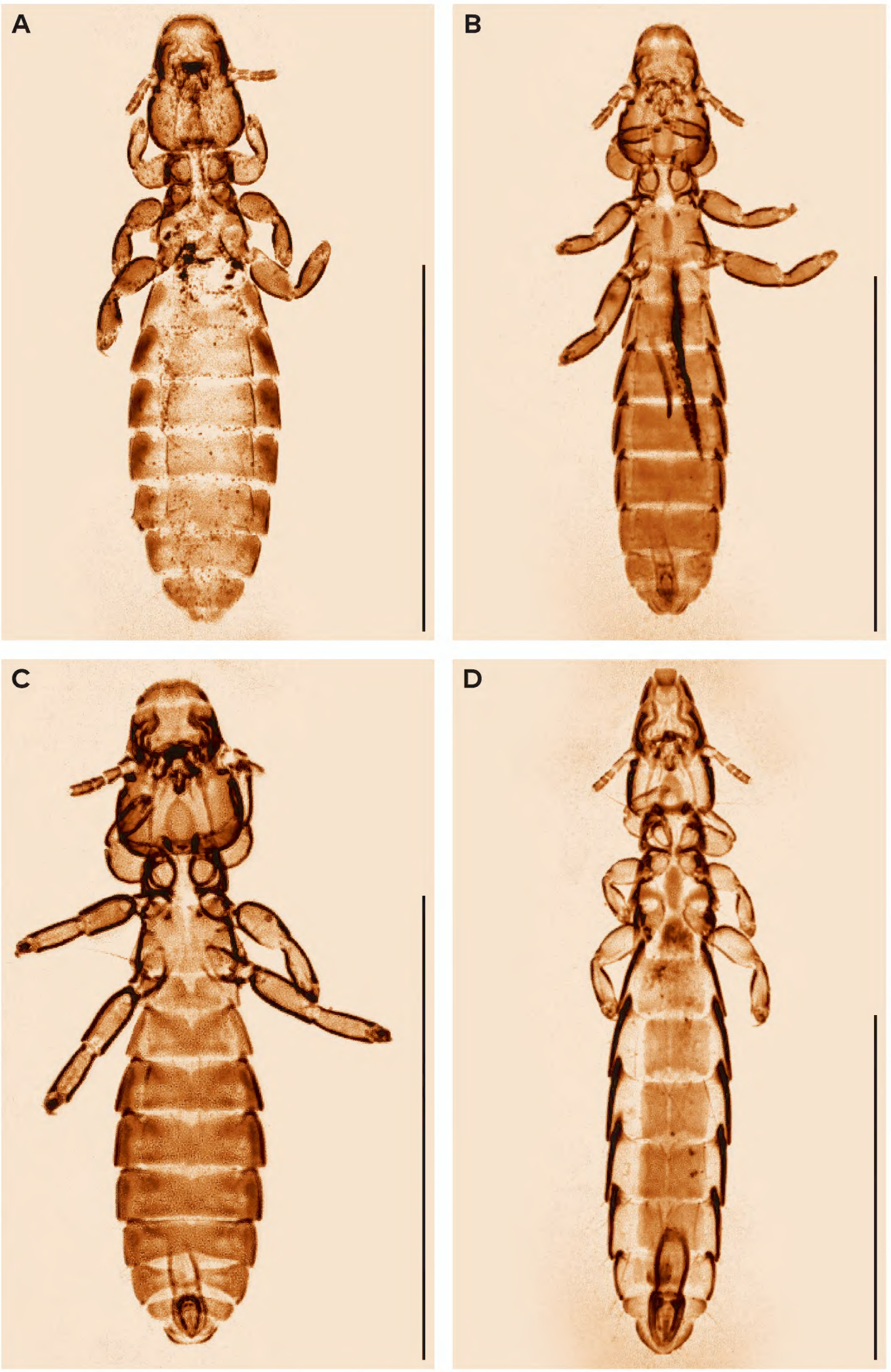

Figure 3. A *Lunaceps actophilus,* female, from *Calidris alba,* original; **B** *Lunaceps falcinellus,* male, from *Calidris ferruginea,* original; **C** *Lunaceps schismatus,* male, from *Calidris alpina,* original; **D** *Quadraceps hiaticulae,* male, from *Charadrius hiaticula,* original. Scale bar = 1000 μm.

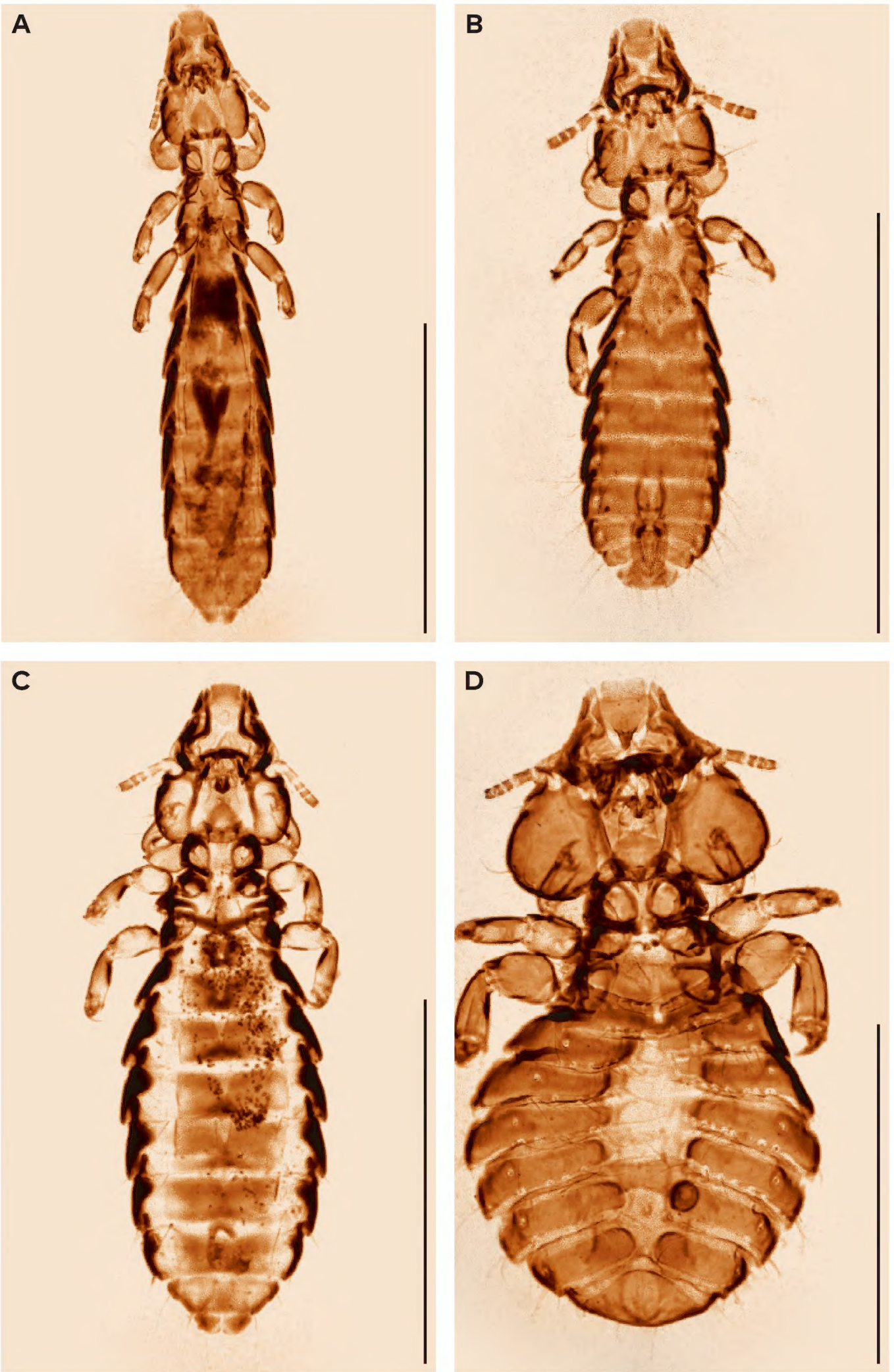

Figure 4. **A** *Quadraceps obscurus*, female, from *Tringa glareola,* original; **B** *Quadraceps ravus*, male, from *Actitis hypoleucos,* original; **C** *Quadraceps strepsilaris*, female, from *Arenaria interpres,* original; **D** *Saemundssonia platygaster frater*, female, from *Actitis hypoleucos,* original. Scale bar = 1000 μm.

dubius, Charadrius hiaticula). *Quadraceps hiaticula* on *Charadrius dubius* has the highest prevalence as 100%. Three *Saemundssonia platygaster frater* were detected on 5 out of 7 *Actitis hypoleucos*.

Sample sizes of species of *Lunaceps* were the largest, while those of *Austromenopon* and *Saemundssonia* were the lowest (Table 2). *Lunaceps schismatus* was the most abundant species, with 494 (261♀, 222♂ 11N) specimens from *Calidris alpina*, and two specimens (1♀, 1♂) from *Actitis hypoleucos*. *Lunaceps falcinellus* was next, with 157 specimens (87♀, 63♂ 7N) from *Calidris minuta*, 109 specimens (52♀, 30♂, 27N) from *Calidris ferruginea*, nine specimens (5♀, 3♂, 1N) from *Calidris falcinellus*, and 2 specimens (1♀, 1♂) from *Actitis hypoleucos* (Table 2).

Discussion and Conclusion

The chewing lice fauna from charadriiform birds was poorly known in Turkey. Until now, only 21 out of 87 free living charadriiform species had been examined in Turkey for lice, with 18 of them infested with only one louse species. Previous studies (Açıcı et al. 2011, Dik et al. 2010, 2011a, 2011b, 2015, 2017a, 2017b, Dik and Uslu 2008, Girişgin et al. 2013, 2022, Orunç Kılıç et al. 2013, Göz et al. 2015, Özkan et al. 2017, Eren et al. 2022) reported 38 louse species from Turkey. With the addition of the results of the current study a total of 29 chaardriiform species examined for the presence of chewing lice and in total 25 charadriiform species were infested. The total number of lice species found on the charadriiform species were as 51 louse species from Turkey (Table 3).

Species of *Actornithophilus* Ferris 1916 are parasitic on birds belonging to the order Charadriiformes only, in particular those of the families Charadriidae, Haematopodidae, Laridae, Recurvirostridae and Scolopacidae (Clay 1962, Price et al. 2013, Timmermann 1954a, 1954b). Eight species and subspecies of *Actornithophilus* had been previously reported from Turkey (Dik et al. 2010, 2011b, Göz et al. 2015, Özkan et al. 2017): *Ac. hoplopteri* (Mjöberg, 1910), *Ac. multisetosus* (Blagoveshtchensky, 1940), *Ac. piceus lari* (Packard, 1870), *Ac. pustulosus* (Piaget, 1880), *Ac. spinulosus* (Piaget, 1880), *Ac. stictus* (Kellogg & Paine, 1911), *Ac. totani* (Schrank, 1803) and *Ac. umbrinus* (Burmeister, 1838). This paper adds two new records of species of *Actornithophilus* to the Turkish louse fauna: *Ac. bicolor* (Piaget, 1880) on Ruddy turnstone (*Arenaria interpres*), and *Ac. ochraceus* (Nitzsch, 1818) on Common ringed plover (*Charadrius hiaticula*), which had been previously reported from European golden plover (*Pluvialis apricaria* (Linnaeus, 1758)), Common ringed plover (*Charadrius hiaticula*) and Little ringed plover (*Charadrius dubius*)(Price et al. 2003). However, *Ac. ochraceus* was not found on Little ringed plovers (*Charadrius dubius*) in this study. Clay (1962) stated that *Ac. ochraceus* were atypical or natural stragglers on European golden plovers (*Pluvialis apricaria*). However, Gustafsson et al. (2018) reported *Ac. ochraceus* on European golden plovers (*Pluvialis apricaria*), as well as on Common ringed plovers (*Charadrius hiaticula*) and Grey plovers (*Pluvialis*

Table 2. Numbers of lice recorded from charadriiform birds in Kızılırmak Delta, Turkey

Bird family	Bird species	Louse species	♀	♂	N*	Total
Scolopacidae	*Actitis hypoleucos*	*Actornithophilus* sp.	0	0	1	1
		Lunaceps falcinellus	1	1	0	2
		Lunaceps schismatus	1	1	0	2
		Quadraceps ravus	4	1	0	5
		Saemundssonia platygaster frater	1	0	9	10
Scolopacidae	*Arenaria interpres*	*Actornithophilus bicolor*	12	15	7	34
		Austromenopon lutescens	1	0	1	2
		Carduiceps sp.	1	0	0	1
		Quadraceps strepsilaris	26	33	0	59
Scolopacidae	*Calidris alba*	*Actornithophilus umbrinus*	6	4	0	10
		Carduiceps zonarius	3	3	0	6
		Lunaceps actophilus	7	4	0	11
Scolopacidae	*Calidris alpina*	*Carduiceps meinertzhageni*	6	10	0	16
		Lunaceps schismatus	261	222	11	494
		Quadraceps hiaticulae	0	1	0	1
Scolopacidae	*Calidris falcinellus*	*Carduiceps fulvofasciatus*	4	2	0	6
		Lunaceps falcinellus	3	5	1	9
Scolopacidae	*Calidris ferruginea*	*Actornithophilus umbrinus*	17	11	1	29
		Carduiceps zonarius	28	11	0	39
		Lunaceps falcinellus	52	30	27	109
Scolopacidae	*Calidris minuta*	*Austromenopon* sp.	0	1	1	2
		Carduiceps zonarius	6	8	0	14
		Lunaceps falcinellus	87	63	7	157
Scolopacidae	*Tringa glareola*	*Actornithophilus totani*	0	1	1	2
		Quadraceps obscurus	7	5	0	12
Charadriidae	*Charadrius dubius*	*Quadraceps hiaticulae*	1	0	0	1
Charadriidae	*Charadrius hiaticula*	*Actornithophilus ochraceus*	13	5	1	19
		Quadraceps hiaticulae	4	6	0	10
		Quadraceps sp.	2	1	0	3
TOTAL			**554**	**444**	**68**	**1066**

*N=nymphs

squatarola (Linnaeus, 1758)) in Sweden. *Actornithophilus umbrinus* (Burmeister, 1838) is a cosmopolitan species, originally described from the Curlew sandpiper (*Calidris ferruginea*), but later reported from many species of Charadriiformes, especially of the genus *Calidris* (Clay 1962, Dik et al. 2010, Price et al. 2003). In Turkey,

Ac. umbrinus was previously reported from *Calidris alpina* and *Calidris minuta* (Dik et al. 2010), but this study recorded it from *Calidris alba* and *Calidris ferruginea* for the first time in this country. *Actornithophilus totani* has been recorded from several species of *Tringa* (Clay 1962, Price et al. 2003), and it was previously reported from Wood sandpiper (*Tringa glareola*) in Turkey (Dik et al. 2010, Dik et al. 2017a). The Common sandpiper (*Actitis hypoleucos*) is parasitized by *Actornithophilus flumineus* Clay 1962 (Clay 1962, Price et al. 2003) but, as only a single nymph of *Actornithophilus* was collected from a Common sandpiper (*Actitis hypoleucos*) in this study, it could not be identified at species level. However, this is the first record of *Actornithophilus* from the Common sandpiper (*Actitis hypoleucos*) in Turkey.

Species of *Austromenopon* Bedford, 1939 are parasitic on birds in the orders Charadriiformes, Procellariiformes and Pelecaniformes (Price and Clay 1972, Price et al. 2003). In Turkey, no species of the Procellariiformes has been examined for lice. However, several individuals of eight species of Pelecaniformes occurring in Turkey have been examined, without recording any specimen of *Austromenopon*, this may be due to the fact that *Austromenopon* species traditionally occur on tropical Pelecaniformes members (Dik and Uslu 2008, Inci et al. 2010, Girişgin et al. 2013). Regarding Charadriiformes, six species of *Austromenopon* have been reported in Turkey (Dik et al. 2010, 2017a, 2017b): *Au. alpinum* Timmermann, 1954 on Dunlin, *Au. atrofulvum* (Piaget, 1880) on White-winged black terns (*Chlidonias leucopterus* (Temminck, 1815)), *Au. decorosum* Złotorzycka, 1968 on Wood sandpipers, *Au. durisetosum* Blagoveshtchensky, 1948 on Common snipes (*Gallinago gallinago*), *Au. lutescens* (Burmeister, 1838) on Little stints (*Calidris minuta*) and Ruffs (*Calidris pugnax* (Linnaeus, 1758)) and *Au. transversum* (Denny, 1842) on Mediterranean gulls (*Ichthyaetus melanocephalus* Temminck, 1820). In this study, only two specimens of *Austromenopon* (one male and one nymph) were collected from Little stints (*Calidris minuta*), and two specimens (one female and one nymph) of *Au. lutescens* from Ruddy turnstones (*Arenaria interpres*). Price et al. (2003) do not list any species of *Austromenopon* from Little stints (*Calidris minuta*). However, *Au. lutescens* was reported from Little stints (*Calidris minuta*) in a study performed in the Province of Kars in Eastern Turkey (Dik et al. 2010). The genitalia of our male specimen from

Table 3. Lice species recorded from charadriiform birds in Turkey.

Family	Host species	Louse species	Source
Recurvirostridae	*Himantopus himantopus*	-	Dik et al. 2011b
Charadriidae	*Charadrius dubius*	*Quadraceps hiaticulae*	Current study
	Charadrius hiaticula	*Actornitophilus ochraceus*	Current study
		Quadraceps hiaticulae	Current study
		Quadraceps sp.	Current study
	Vanellus spinosus	*Actornithophilus hoplopteri*	Özkan et al. 2017

Table 3. (continued)

Family	Host species	Louse species	Source
Scolopacidae	*Actitis hypoleucos*	*Actornithophilus* sp.	Current study
		Lunaceps falcinellus	Current study
		Lunaceps schismatus	Current study
		Quadraceps ravus	Current study
		Saemundssonia platygaster frater	Current study
	Arenaria interpres	*Actornithophilus bicolor*	Current study
		Austromenopon lutescens	Current study
		Carduiceps sp.	Current study
		Quadraceps strepsilaris	Current study
	Calidris alba	*Actornitophilus umbrinus*	Current study
		Carduiceps zonarius	Current study
		Lunaceps actophilus	Current study
	Calidris alpina	*Actornithophilus umbrinus*	Dik et al. 2010
		Austromenopon alpinum	Dik et al. 2010
		Carduiceps meinertzhagani	Dik et al. 2010
		Lunaceps actophilus	Dik et al. 2010
		Lunaceps schismatus	Current study
		Quadraceps hiaticulae	Current study
	Calidris falcinellus	*Carduiceps fulvofasciatus*	Current study
		Lunaceps falcinellus	Current study
	Calidris ferruginea	*Actornitophilus umbrinus*	Current study
		Carduiceps zonarius	Current study
		Lunaceps falcinellus	Current study
	Calidris minuta	*Actornithophilus umbrinus*	Dik et al. 2010
		Austromenopon lutescens	Dik et al. 2010
		Carduiceps zonarius	Dik et al. 2010
		Lunaceps drosti	Dik et al. 2010
		Austromenopon sp.	Current study
		Lunaceps falcinellus	Current study
	Calidris pugnax	*Actornithophilus pustulosus*	Dik et al. 2010
		Austromenopon lutescens	Dik et al. 2010
		Carduiceps scalaris	Dik et al. 2010
		Lunaceps holophaeus	Dik et al. 2010
	Calidris temminckii	*Lunaceps incoensis*	Dik et al. 2010
	Gallinago gallinago	*Actornithophilus stictus*	Dik et al. 2010
		Austromenopon durisetosum	Dik et al. 2010
		Cummingsiella ambigua	Dik et al. 2011a
		Rhynonirmus scolopacis	Dik et al. 2010
	Limosa limosa	*Actornitophilus spinulosus*	Dik et al. 2017a
		Lunaceps sp.	Dik et al. 2017a
	Lymnocryptes minimus	*Actornithophilus multisetosus*	Dik et al. 2011a
	Numenius arquata	*Actornithophilus patellatus*	Açıcı et al. 2021
		Cummingsiella ovalis	Açıcı et al. 2021
		Lunaceps numeni	Açıcı et al. 2021
	Scolopax rusticola	*Rhynonirmus helvolus*	Dik et al. 2015
		Saemundssonia clayae	Girişgin et al. 2022
		Saemundssonia sp.	Dik et al. 2015
	Tringa glareola	*Actornitophilus totani*	Dik et al. 2017a
		Austromenopon sp.	Dik et al. 2010
		Quadraceps obscurus	Dik et al. 2010
	Tringa totanus	-	Açıcı et al. 2011; Dik et al. 2011b; Current study
	Xenus cinereus	-	Current study

Table 3. (continued)

Family	Host species	Louse species	Source
Laridae	*Chlidonias leucopterus*	*Actornithophilus piceus piceus*	Dik et al. 2011b
		Austromenopon atrofulvum	Dik et al. 2010
		Quadraceps anagrapsus	Dik et al. 2010
		Saemundssonia lobaticeps	Dik et al. 2010
	Chroicocephalus genei	*Actornitophilus piceus*	Girişgin et al. 2022
		Saemundssonia lari	Dik et al. 2011b
	Ichthyaetus melanocephalus	*Austromenopon transversum*	Dik et al. 2017b
		Quadraceps punctatus	Dik et al. 2017b
		Saemundssonia lari	Dik et al. 2017b
	Larus armenicus	*Actornithophilus piceus lari*	Göz et al. 2015
		Quadraceps punctatus	Orunç Kılıç et al. 2013
		Saemundssonia lari	Orunç Kılıç et al. 2013
	Larus cachinnans	*Actornitophilus piceus*	Girişgin et al. 2022
		Saemundssonia lari	Girişgin et al. 2013
	Larus michahellis	*Quadraceps punctatus*	Eren et al. 2022
		Saemundssonia lari	Eren et al. 2022
	Sterna hirundo	-	Dik 2010
	Sternula albifrons	*Quadraceps anagrapsus*	Açıcı et al. 2011
		Quadraceps nycthemerus	Açıcı et al. 2021

Little stint (*Calidris minuta*) appeared to be different from those of *Au. lutescens*; however, we could not identify it to species level, because it was in poor condition, and the diagnostic morphological characters could not be seen clearly.

Species of the genus *Carduiceps* are parasitic on birds belonging to the family Scolopacidae, in particular the subfamily Calidrinae, in the order Charadriiformes. Few species have been described in this genus (Timmermann 1954a, Price et al. 2003, Gustafsson and Olsson 2017). Three species of *Carduiceps* have been previously recorded from Turkey: *Ca. meinertzhageni* from Dunlins (*Calidris alpina*), *Ca. scalaris* (Piaget, 1880) from Ruffs (*Calidris pugnax*) and *Ca. zonarius* from Little stints (*Calidris minuta*) (Dik et al. 2010). Timmermann (1954a) stated that the species of *Carduiceps* can be separated by examining the male genitalia, while the females have a uniform morphology. Gustafsson et al. (2018) provided an identification key for species of *Carduiceps*, but based on males only. In this study, three species have been identified: *Ca. meinertzhageni* from Dunlins (*Calidris alpina*), *Ca. zonarius* from Curlew sandpipers (*Calidris ferruginea*) and Little stints (*Calidris minuta*), and *Ca. fulvofasciatus* from Broad-billed sandpipers (*Calidris falcinellus*). One female of *Carduiceps* collected from a Ruddy turnstone (*Arenaria interpres*) could not be identified at the species level for the reasons mentioned above. Considering that *Carduiceps* has not yet been recorded from Ruddy turnstones (*Arenaria interpres*) (Price et al. 2003), it is uncertain whether the female reported here is a straggler, or a natural host.

Species of the genus *Lunaceps* Clay and Meinertzhagen, 1939 are parasitic on shorebirds of the family Scolopacidae (Price et al. 2003, Gustafsson and Olsson 2012), and they are morphologically uniform (Gustafsson and Olsson 2012). Five species of

Lunaceps have been previously recorded from Turkey: *Lu. actophilus* on Sanderlings (*Calidris alba*) and Dunlins (*Calidris alpina*), *Lu. drosti* Timmermann, 1954 on Little stints (*Calidris minuta*), *Lu. holophaeus* (Burmeister, 1838) on Ruffs (*Calidris pugnax*), *Lu incoensis* (Kellogg & Chapman, 1899) on Temminck's stints (*Calidris temminckii*), and *Lunaceps* sp. on Black-tailed godwits [*Limosa limosa* (Linnaeus, 1758)] (Dik et al. 2010). However, Gustafsson & Olsson (2012) regarded the records of *Lu. drosti* and *Lu. incoensis* reported in Turkey by Dik et *al.* (2010) as junior synonyms of *Lu. falcinellus*. In this study, two species were identified for the first time in Turkey: *Lu. falcinellus* from Common sandpipers (*Actitis hypoleucos*), Broad-billed sandpipers (*Calidris falcinellus*), Curlew sandpipers (*Calidris ferruginea*) and Little stints (*Calidris minuta*), and *L. schismatus* on Common sandpipers (*Actitis hypoleucos*) and Dunlins (*Calidris alpina*).

Species of *Quadraceps* parasitise most charadriiform birds (Timmermann 1952, 1953, Overgaard 1952, Clay 1954, Gustfsson et al. 2018). In Turkey, three *Quadraceps* species have been reported: *Qu. anagrapsus* from Little terns (*Sternula albifrons* (Pallas, 1764)) and White-winged black terns (*Chlidonias leucopterus*), *Qu. punctatus* from Mediterranean (*Ichthyaetus melanocephalus*) and Yellow-legged gulls (*Larus michahellis* Naumann, 1840) and *Qu. obscurus* (Burmeister, 1838) from Wood sandpipers (*Tringa glareola*) (Açıcı et al. 2011, Dik et al. 2010, 2011a, 2017a, 2017b, Göz et al. 2015). In this study, four *Quadraceps* species (*Qu. hiaticulae, Qu. obscurus, Qu. ravus, Qu. strepsilaris*) were collected and identified, plus one specimen which could not be identified at species level. Except *Q. obscurus*, the other three species are reported for the first time in Turkey. Two *Quadraceps* species: *Qu. hiaticulae* and *Qu. fissus* have been recorded on Common ringed plovers (*Charadrius hiaticula*) (Timmermann 1957, Price et al. 2003). Seven out of 15 Common ringed plovers (*Charadrius hiaticula*) examined in this study, were found to be infested with chewing lice. *Quadraceps hiaticulae* was collected from five of them, while *Qu. fissus* was not found. In addition, a new *Quadraceps* species was found on two of them. This species is similar to *Qu. ravus*, but the male genitalia are quite different from those of *Qu. ravus*. In addition, *Qu. hiaticulae* was recorded from Little ringed plovers (*Charadrius dubius*) for the first time in the world. A male *Q. hiaticulae* was collected from a Dunlin (*Calidris alpina*) in this study but, considering that no *Quadraceps* species has been reported from Dunlin (*Calidris alpina*) (Price et al. 2003), we regard it as a straggler.

Species of *Saemundssonia* (Timmermann, 1936) parasitize birds belonging to the orders Anseriformes, Charadriiformes, Gruiformes and Procellariiformes (Price et al. 2003). Two *Saemundssonia* species have been recorded in Turkey: *Sa. lobaticeps* (Giebel, 1874) from White-winged black terns (*Chlidonias leucopterus*) and *Sa. lari* (O. Fabricius, 1780) from Mediterranean, Caspian (*Larus cachinnans* Pallas, 1811) and Yellow-legged gulls (*Larus michahellis*) (Dik et al. 2010, 2017b, Göz et al. 2015). In addition, a nymph of *Saemundssonia* collected from a Eurasian woodcock (*Scolopax rusticola* Linnaeus, 1758) could not be identified to species level (Dik et al. 2015). In this study, only a few specimens of *Saemundssonia* from Common sandpipers (*Actitis*

hypoleucos) were collected and identified as *Sa. platygaster frater*, which is reported for the first time from Turkey.

In a previous study carried out in Turkey, *Austromenopon durisetosum* (Blagoveshtchensky, 1948), *Cummingsiella ambigua* (Burmeister, 1838) and *Rhynonirmus scolopacis* (Denny, 1842) from Common snipes (*Gallinago gallinago*) were reported (Dik et al. 2011a). However, no louse sample was found on four Common snipes (*Gallinago gallinago*) examined in the present study. In another study (Dik et al. 2017a), *Ac. totani* and *Qu. obtusus* were reported from Wood sandpipers (*Tringa glareola*), and both louse species have been recorded from the same bird species in this study.

Considering the total lice fauna of wild birds in Turkey, 188 bird species belonging to 21 order and 52 families were examined, and a total of 122 bird species from 45 families were infested. A total of 217 lice species were recorded in total. There were 21 chewing lice species identified at genus level, while 196 were identified at species level. The maximum chewing lice species found on a single species was nine on *Buteo buteo* and *Buteo rufinus*,followed by 6 lice species on *Ciconia ciconia, Columba livia* and *Turdus merula*. The maximum number of chewing lice species recorded on different bird species were 8 for *Menacanthus currucae* (on *Acrocephalus scirpaceus, Sylvia atricapilla, Sylvia borin, Curruca communis, Curruca nisoria, Iduna pallida, Luscinia luscinia, Phylloscopus collybita*) and *Menacanthus eurysternus* (on *Erithacus rubecula, Passer domesticus, Phylloscopus collybita, Phylloscopus trochilus, Pica pica, Sturnus vulgaris, Turdus merula, Turdus philomelos*) 7 for *Trinoton querquedulae* (on *Anas acuta, Anas crecca, Anas platyrhynchos, Aythya ferina, Aythya fuligula, Spatula querquedula, Tadorna ferruginea*).

In conclusion, the following species: *Ac. bicolor, Ac. ochraceus, Ca. fulvofasciatus, Lu. falcinellus, Lu. schismatus, Qu. hiaticulae, Qu. ravus, Qu. strepsilaris* and *Sa. platygaster frater* are reported here for the first time in Turkey in this paper. Also, we have increased the number of charadriiform bird species examined for lice in Turkey to 29, with 25 of them found to be infested. More parasitological surveys are needed to increase knowledge of the chewing lice fauna of the remaining bird species of Charadriiformes from Turkey. Only 188 bird species out of 497 in Turkey have been examined for louse species. There are many more studies needed to increase the coverage of examined species in Turkey to increase the number of the lice fauna (Suppl. Appendix).

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Appendix 1. Louse checklist of wild birds in Turkey.

	Order	Family	Host species	Louse species	Source
1	ACCIPITRIFORMES	Accipitridae	*Accipiter brevipes*	-	Dik et al. 2011a
2	ACCIPITRIFORMES	Accipitridae	*Accipiter gentilis*	*Colpocephalum polonum*	Dik et al. 2011b
3	ACCIPITRIFORMES	Accipitridae	*Accipiter nisus*	*Colpocephalum nanum*	Dik et al. 2013c
4	ACCIPITRIFORMES	Accipitridae	*Accipiter nisus*	*Degeeriella nisus*	Dik et al. 2013c
5	ACCIPITRIFORMES	Accipitridae	*Accipiter nisus*	*Colpocephalum polonum*	Girişgin et al. 2022
6	ACCIPITRIFORMES	Accipitridae	*Aegypius monachus*	*Colpocephalum trachelioti*	Dik & Yamaç 2008
7	ACCIPITRIFORMES	Accipitridae	*Aegypius monachus*	*Falcolipeurus quadripustulatus*	Dik et al. 2013c
8	ACCIPITRIFORMES	Accipitridae	*Aegypius monachus*	*Laemobothrion vulturis*	Dik et al. 2013c
9	ACCIPITRIFORMES	Accipitridae	*Aquila chrysaetos*	*Colpocephalum impressum*	Eren et al. 2022
10	ACCIPITRIFORMES	Accipitridae	*Aquila chrysaetos*	*Craspedorrhynchus aquilinus*	Eren et al. 2022
11	ACCIPITRIFORMES	Accipitridae	*Aquila chrysaetos*	*Degeeriella fulva*	Eren et al. 2022
12	ACCIPITRIFORMES	Accipitridae	*Aquila chrysaetos*	*Laemobothrion sp.*	Göz et al. 2015
13	ACCIPITRIFORMES	Accipitridae	*Aquila pennatus*	*Laemobothrion maximum*	Girişgin et al. 2013
14	ACCIPITRIFORMES	Accipitridae	*Buteo buteo*	*Kurodaia fulvofasciata*	Dik 2010
15	ACCIPITRIFORMES	Accipitridae	*Buteo buteo*	*Colpocephalum turbinatum*	Eren et al. 2022
16	ACCIPITRIFORMES	Accipitridae	*Buteo buteo*	*Degeeriella nisus*	Girişgin et al. 2013
17	ACCIPITRIFORMES	Accipitridae	*Buteo buteo*	*Degeeriella sp.*	Girişgin et al. 2013
18	ACCIPITRIFORMES	Accipitridae	*Buteo buteo*	*Falcolipeurus suturalis*	Girişgin et al. 2013
19	ACCIPITRIFORMES	Accipitridae	*Buteo buteo*	*Colpocephalum nanum*	Inci et al. 2010
20	ACCIPITRIFORMES	Accipitridae	*Buteo buteo*	*Craspedorrhynchus platystomus*	Inci et al. 2010
21	ACCIPITRIFORMES	Accipitridae	*Buteo buteo*	*Degeeriella fulva*	Inci et al. 2010
22	ACCIPITRIFORMES	Accipitridae	*Buteo buteo*	*Laemobothrion maximum*	Inci et al. 2010

Appendix 1. (continued)

	Order	Family	Host species	Louse species	Source
23	ACCIPITRIFORMES	Accipitridae	*Buteo rufinus*	*Craspedorrhynchus platystomus*	Dik & Özkayhan 2007
24	ACCIPITRIFORMES	Accipitridae	*Buteo rufinus*	*Colpocephalum sp.*	Dik 2006
25	ACCIPITRIFORMES	Accipitridae	*Buteo rufinus*	*Degeeriella fulva*	Dik 2006
26	ACCIPITRIFORMES	Accipitridae	*Buteo rufinus*	*Laemobothrion maximum*	Dik 2006
27	ACCIPITRIFORMES	Accipitridae	*Buteo rufinus*	*Colpocephalum nanum*	Dik & Özkayhan 2007
28	ACCIPITRIFORMES	Accipitridae	*Buteo rufinus*	*Kurodaia fulvofasciata*	Göz et al. 2015
29	ACCIPITRIFORMES	Accipitridae	*Buteo rufinus*	*Laemobothrion sp.*	Gülanber et al. 2006
30	ACCIPITRIFORMES	Accipitridae	*Buteo rufinus*	*Craspedorrhynchus sp.*	Gülanber et al. 2006
31	ACCIPITRIFORMES	Accipitridae	*Buteo rufinus*	*Degeeriella sp.*	Gülanber et al. 2006
32	ACCIPITRIFORMES	Accipitridae	*Circaetus gallicus*	*Degeeriella leucopleura*	Girişgin et al. 2013
33	ACCIPITRIFORMES	Accipitridae	*Circus aeruginosus*	*Colpocephalum turbinatum*	Dik et al. 2013c
34	ACCIPITRIFORMES	Accipitridae	*Circus aeruginosus*	*Degeeriella fusca*	Dik et al. 2013c
35	ACCIPITRIFORMES	Accipitridae	*Circus aeruginosus*	*Kurodaia fulvofasciata*	Göz et al. 2015
36	ACCIPITRIFORMES	Accipitridae	*Circus pygargus*	-	Göz et al. 2015
37	ACCIPITRIFORMES	Accipitridae	*Clanga clanga*	-	Dik 2010
38	ACCIPITRIFORMES	Accipitridae	*Milvus migrans*	*Colpocephalum milvi*	Inci et al. 2010
39	ACCIPITRIFORMES	Accipitridae	*Pernis apivorus*	*Degeeriella phlyctopygus*	Dik et al. 2013c
40	ACCIPITRIFORMES	Accipitridae	*Pernis apivorus*	*Colpocephalum apivorus*	Eren et al. 2022
41	ACCIPITRIFORMES	Accipitridae	*Pernis apivorus*	*Colpocephalum sp.*	Inci et al. 2010
42	ACCIPITRIFORMES	Accipitridae	*Pernis apivorus*	*Degeeriella fulva*	Inci et al. 2010
43	ACCIPITRIFORMES	Pandionidae	*Pandion haliaetus*	*Colpocephalum napiforme*	Eren et al. 2022
44	ACCIPITRIFORMES	Pandionidae	*Pandion haliaetus*	*Degeeriella phlyctopygus*	Eren et al. 2022

Appendix 1. (continued)

	Order	Family	Host species	Louse species	Source
45	ANSERIFORMES	Anatidae	*Anas acuta*	*Anatoecus icterodes*	Dik & Uslu 2012
46	ANSERIFORMES	Anatidae	*Anas acuta*	*Holomenopon clypeilargum*	Dik & Uslu 2012
47	ANSERIFORMES	Anatidae	*Anas acuta*	*Anaticola crassicornis*	Dik et al. 2011a
48	ANSERIFORMES	Anatidae	*Anas acuta*	*Holomenopon sp.*	Dik et al. 2011a
49	ANSERIFORMES	Anatidae	*Anas acuta*	*Trinoton querquedulae*	Dik et al. 2011a
50	ANSERIFORMES	Anatidae	*Anas crecca*	*Anaticola crassicornis*	Dik & Uslu 2012
51	ANSERIFORMES	Anatidae	*Anas crecca*	*Anatoecus dentatus*	Dik & Uslu 2012
52	ANSERIFORMES	Anatidae	*Anas crecca*	*Anatoecus icterodes*	Dik & Uslu 2012
53	ANSERIFORMES	Anatidae	*Anas crecca*	*Trinoton querquedulae*	Dik & Uslu 2012
54	ANSERIFORMES	Anatidae	*Anas platyrhynchos*	*Holomenopon leucoxanthum*	Açıcı et al. 2021
55	ANSERIFORMES	Anatidae	*Anas platyrhynchos*	*Anaticola crassicornis*	Aksın 2011
56	ANSERIFORMES	Anatidae	*Anas platyrhynchos*	*Anatoecus sp.*	Aksın 2011
57	ANSERIFORMES	Anatidae	*Anas platyrhynchos*	*Trinoton querquedulae*	Aksın 2011
58	ANSERIFORMES	Anatidae	*Anas platyrhynchos*	*Holomenopon sp.*	Göz et al. 2015
59	ANSERIFORMES	Anatidae	*Anser anser*	*Anaticola anseris*	Aksın 2004
60	ANSERIFORMES	Anatidae	*Anser anser*	*Holomenopon sp*	Göz et al. 2015
61	ANSERIFORMES	Anatidae	*Anser anser*	*Trinoton anserinum*	Göz et al. 2015
62	ANSERIFORMES	Anatidae	*Aythya ferina*	*Anaticola mergiserrati*	Dik et al. 2017b
63	ANSERIFORMES	Anatidae	*Aythya ferina*	*Anatoecus icterodes*	Dik et al. 2017b
64	ANSERIFORMES	Anatidae	*Aythya ferina*	*Trinoton querquedulae*	Eren et al. 2022
65	ANSERIFORMES	Anatidae	*Aythya fuligula*	*Trinoton querquedulae*	Dik et al. 2017b
66	ANSERIFORMES	Anatidae	*Cygnus cygnus*	*Anaticola crassicornis*	Eren et al. 2022

Appendix 1. (continued)

	Order	Family	Host species	Louse species	Source
67	ANSERIFORMES	Anatidae	*Cygnus cygnus*	*Anatoecus cygni*	Eren et al. 2022
68	ANSERIFORMES	Anatidae	*Cygnus cygnus*	*Ciconiphilus cygni*	Eren et al. 2022
69	ANSERIFORMES	Anatidae	*Cygnus cygnus*	*Ornithobius cygni*	Eren et al. 2022
70	ANSERIFORMES	Anatidae	*Cygnus cygnus*	*Trinoton anserinum*	Oğuz et al. 2015
71	ANSERIFORMES	Anatidae	*Mareca strepera*	*Anaticola sp.*	Dik et al. 2017b
72	ANSERIFORMES	Anatidae	*Netta rufina*	*Anatoecus sp.*	Dik 2006
73	ANSERIFORMES	Anatidae	*Spatula clypeata*	-	Göz et al. 2015
74	ANSERIFORMES	Anatidae	*Spatula querquedula*	*Trinoton querquedulae*	Dik & Uslu 2012
75	ANSERIFORMES	Anatidae	*Tadorna ferruginea*	*Anaticola magnificus*	Dik & Uslu 2012
76	ANSERIFORMES	Anatidae	*Tadorna ferruginea*	*Anatoecus regina*	Dik & Uslu 2012
77	ANSERIFORMES	Anatidae	*Tadorna ferruginea*	*Holomenopon tadornae*	Dik & Uslu 2012
78	ANSERIFORMES	Anatidae	*Tadorna ferruginea*	*Trinoton querquedulae*	Dik & Uslu 2012
79	ANSERIFORMES	Anatidae	*Tadorna tadorna*	*Anaticola crassicornis*	Dik & Uslu 2012
80	ANSERIFORMES	Anatidae	*Tadorna tadorna*	*Trinoton sp.*	Dik & Uslu 2012
81	APODIFORMES	Apodidae	*Apus apus*	*Dennyus hirundinis*	Karataş et al. 2008
82	APODIFORMES	Apodidae	*Apus melba*	-	Girişgin et al. 2022
83	BUCEROTIFORMES	Upupidae	*Upupa epops*	*Upupicola upupae*	Açıcı et al. 2021
84	BUCEROTIFORMES	Upupidae	*Upupa epops*	*Menacanthus fertilis*	Dik et al. 2017a
85	CAPRIMULGIFORMES	Caprimulgidae	*Caprimulgus europaeus*	*Mulcticola hypoleucus*	Dik 2009
86	CHARADRIIFORMES	Charadriidae	*Vanellus spinosus*	*Actornithophilus hoplopteri*	Özkan et al. 2017
87	CHARADRIIFORMES	Laridae	*Chlidonias leucopterus*	*Austromenopon atrofulvum*	Dik et al. 2010
88	CHARADRIIFORMES	Laridae	*Chlidonias leucopterus*	*Quadraceps anagrapsus*	Dik et al. 2010

Appendix 1. (continued)

	Order	Family	Host species	Louse species	Source
89	CHARADRIIFORMES	Laridae	*Chlidonias leucopterus*	*Saemundssonia lobaticeps*	Dik et al. 2010
90	CHARADRIIFORMES	Laridae	*Chlidonias leucopterus*	*Actornithophilus piceus piceus*	Dik et al. 2011b
91	CHARADRIIFORMES	Laridae	*Chroicocephalus genei*	*Saemundssonia lari*	Dik et al. 2011b
92	CHARADRIIFORMES	Laridae	*Chroicocephalus genei*	*Actornitophilus piceus*	Girişgin et al. 2022
93	CHARADRIIFORMES	Laridae	*Ichthyaetus melanocephalus*	*Austromenopon transversum*	Dik et al. 2017b
94	CHARADRIIFORMES	Laridae	*Ichthyaetus melanocephalus*	*Quadraceps punctatus*	Dik et al. 2017b
95	CHARADRIIFORMES	Laridae	*Ichthyaetus melanocephalus*	*Saemundssonia lari*	Dik et al. 2017b
96	CHARADRIIFORMES	Laridae	*Larus armenicus*	*Actornithophilus piceus lari*	Göz et al. 2015
97	CHARADRIIFORMES	Laridae	*Larus armenicus*	*Quadraceps punctatus*	Orunç Kılıç et al. 2013
98	CHARADRIIFORMES	Laridae	*Larus armenicus*	*Saemundssonia lari*	Orunç Kılıç et al. 2013
99	CHARADRIIFORMES	Laridae	*Larus cachinnans*	*Saemundssonia lari*	Girişgin et al. 2013
100	CHARADRIIFORMES	Laridae	*Larus cachinnans*	*Actornitophilus piceus*	Girişgin et al. 2022
101	CHARADRIIFORMES	Laridae	*Larus michahellis*	*Quadraceps punctatus*	Eren et al. 2022
102	CHARADRIIFORMES	Laridae	*Larus michahellis*	*Saemundssonia lari*	Eren et al. 2022
103	CHARADRIIFORMES	Laridae	*Sterna hirundo*	-	Dik 2010
104	CHARADRIIFORMES	Laridae	*Sternula albifrons*	*Quadraceps anagrapsus*	Açıcı et al. 2011
105	CHARADRIIFORMES	Laridae	*Sternula albifrons*	*Quadraceps nycthemerus*	Açıcı et al. 2021
106	CHARADRIIFORMES	Recurvirostridae	*Himantopus himantopus*	-	Dik et al. 2011b
107	CHARADRIIFORMES	Scolopacidae	*Calidris alpina*	*Actornithophilus umbrinus*	Dik et al. 2010
108	CHARADRIIFORMES	Scolopacidae	*Calidris alpina*	*Austromenopon alpinum*	Dik et al. 2010
109	CHARADRIIFORMES	Scolopacidae	*Calidris alpina*	*Carduiceps meinertzhagani*	Dik et al. 2010
110	CHARADRIIFORMES	Scolopacidae	*Calidris alpina*	*Lunaceps actophilus*	Dik et al. 2010

Appendix 1. (continued)

	Order	Family	Host species	Louse species	Source
111	CHARADRIIFORMES	Scolopacidae	*Calidris minuta*	*Actornithophilus umbrinus*	Dik et al. 2010
112	CHARADRIIFORMES	Scolopacidae	*Calidris minuta*	*Austromenopon lutescens*	Dik et al. 2010
113	CHARADRIIFORMES	Scolopacidae	*Calidris minuta*	*Carduiceps zonarius*	Dik et al. 2010
114	CHARADRIIFORMES	Scolopacidae	*Calidris minuta*	*Lunaceps drosti*	Dik et al. 2010
115	CHARADRIIFORMES	Scolopacidae	*Calidris pugnax*	*Actornithophilus pustulosus*	Dik et al. 2010
116	CHARADRIIFORMES	Scolopacidae	*Calidris pugnax*	*Austromenopon lutescens*	Dik et al. 2010
117	CHARADRIIFORMES	Scolopacidae	*Calidris pugnax*	*Carduiceps scalaris*	Dik et al. 2010
118	CHARADRIIFORMES	Scolopacidae	*Calidris pugnax*	*Lunaceps holophaeus*	Dik et al. 2010
119	CHARADRIIFORMES	Scolopacidae	*Calidris temminckii*	*Lunaceps incoensis*	Dik et al. 2010
120	CHARADRIIFORMES	Scolopacidae	*Gallinago gallinago*	*Actornithophilus stictus*	Dik et al. 2010
121	CHARADRIIFORMES	Scolopacidae	*Gallinago gallinago*	*Austromenopon durisetosum*	Dik et al. 2010
122	CHARADRIIFORMES	Scolopacidae	*Gallinago gallinago*	*Rhynonirmus scolopacis*	Dik et al. 2010
123	CHARADRIIFORMES	Scolopacidae	*Gallinago gallinago*	*Cummingsiella ambigua*	Dik et al. 2011a
124	CHARADRIIFORMES	Scolopacidae	*Limosa limosa*	*Actornitophilus spinulosus*	Dik et al. 2017a
125	CHARADRIIFORMES	Scolopacidae	*Limosa limosa*	*Lunaceps sp.*	Dik et al. 2017a
126	CHARADRIIFORMES	Scolopacidae	*Lymnocryptes minimus*	*Actornithophilus multisetosus*	Dik et al. 2011a
127	CHARADRIIFORMES	Scolopacidae	*Numenius arquata*	*Actornithophilus patellatus*	Açıcı et al. 2021
128	CHARADRIIFORMES	Scolopacidae	*Numenius arquata*	*Cummingsiella ovalis*	Açıcı et al. 2021
129	CHARADRIIFORMES	Scolopacidae	*Numenius arquata*	*Lunaceps numeni*	Açıcı et al. 2021
130	CHARADRIIFORMES	Scolopacidae	*Scolopax rusticola*	*Rhynonirmus helvolus*	Dik et al. 2015
131	CHARADRIIFORMES	Scolopacidae	*Scolopax rusticola*	*Saemundssonia sp.*	Dik et al. 2015
132	CHARADRIIFORMES	Scolopacidae	*Scolopax rusticola*	*Saemundssonia clayae*	Girişgin et al. 2022

Appendix 1. (continued)

	Order	Family	Host species	Louse species	Source
133	CHARADRIIFORMES	Scolopacidae	*Tringa glareola*	*Austromenopon sp.*	Dik et al. 2010
134	CHARADRIIFORMES	Scolopacidae	*Tringa glareola*	*Quadraceps obscurus*	Dik et al. 2010
135	CHARADRIIFORMES	Scolopacidae	*Tringa glareola*	*Actornitophilus totani*	Dik et al. 2017a
136	CHARADRIIFORMES	Scolopacidae	*Tringa totanus*	-	Açıcı et al. 2011
137	CICONIIFORMES	Ciconiidae	*Ciconia ciconia*	*Ardeicola ciconiae*	Dik & Uslu 2006b
138	CICONIIFORMES	Ciconiidae	*Ciconia ciconia*	*Ardeicola incompletus*	Dik & Uslu 2006b
139	CICONIIFORMES	Ciconiidae	*Ciconia ciconia*	*Colpocephalum quadripustulatus*	Dik & Uslu 2006b
140	CICONIIFORMES	Ciconiidae	*Ciconia ciconia*	*Colpocephalum zebra*	Dik & Uslu 2006b
141	CICONIIFORMES	Ciconiidae	*Ciconia ciconia*	*Neophilopterus incompletus*	Dik & Uslu 2006b
142	CICONIIFORMES	Ciconiidae	*Ciconia ciconia*	*Ciconiphilus quadripustulatus*	Dik et al. 2011b
143	CICONIIFORMES	Ciconiidae	*Ciconia nigra*	*Neophilopterus tricolor*	Açıcı et al. 2021
144	COLUMBIFORMES	Columbidae	*Columba livia*	*Columbicola columbae*	Dik 2010
145	COLUMBIFORMES	Columbidae	*Columba livia*	*Coloceras israelensis*	Dik et al. 2013c
146	COLUMBIFORMES	Columbidae	*Columba livia*	*Menacanthus stramineus*	Eren et al. 2022
147	COLUMBIFORMES	Columbidae	*Columba livia*	*Campanulotes bidentatus*	Girişgin et al. 2022
148	COLUMBIFORMES	Columbidae	*Columba livia*	*Goniodes dissimilis*	Girişgin et al. 2022
149	COLUMBIFORMES	Columbidae	*Columba livia*	*Lipeurus caponis*	Girişgin et al. 2022
150	COLUMBIFORMES	Columbidae	*Streptopelia decaocto*	*Coloceras piageti*	Dik et al. 2013c
151	COLUMBIFORMES	Columbidae	*Streptopelia decaocto*	*Coloceras hilli*	Girişgin et al. 2013
152	COLUMBIFORMES	Columbidae	*Streptopelia decaocto*	*Columbicola bacillus*	Girişgin et al. 2013
153	COLUMBIFORMES	Columbidae	*Streptopelia senegalensis*	*Coloceras chinense*	Girişgin et al. 2013
154	COLUMBIFORMES	Columbidae	*Streptopelia senegalensis*	*Columbicola bacillus*	Girişgin et al. 2022

Appendix 1. (continued)

	Order	Family	Host species	Louse species	Source
155	COLUMBIFORMES	Columbidae	*Streptopelia senegalensis*	*Columbicola columbae*	Girişgin et al. 2022
156	COLUMBIFORMES	Columbidae	*Streptopelia senegalensis*	*Cuclotogaster heterographus*	Girişgin et al. 2022
157	COLUMBIFORMES	Columbidae	*Streptopelia turtur*	*Columbicola bacillus*	Girişgin et al. 2013
158	CORACIIFORMES	Alcedinidae	*Alcedo atthis*	*Alcedofulla alcedinis*	Dik et al. 2017a
159	CORACIIFORMES	Meropidae	*Merops apiaster*	*Meromenopon meropis*	Dik et al. 2011b
160	CORACIIFORMES	Meropidae	*Merops apiaster*	*Meropoecus meropis*	Dik et al. 2011b
161	CORACIIFORMES	Meropidae	*Merops apiaster*	*Brueelia apiastri*	Dik et al. 2013c
162	CORACIIFORMES	Meropidae	*Merops apiaster*	*Meropoecus sp.*	Dik et al. 2013c
163	CORACIIFORMES	Meropidae	*Merops apiaster*	*Meropsiella apiastri*	Dik et al. 2017a
164	CUCULIFORMES	Cuculidae	*Cuculus canorus*	*Cuculicola latirostris*	Açıcı et al. 2011
165	FALCONIFORMES	Falconidae	*Falco columbarius*	-	Dik et al. 2011b
166	FALCONIFORMES	Falconidae	*Falco eleonorae*	-	Girişgin et al. 2022
167	FALCONIFORMES	Falconidae	*Falco naumanni*	*Degeeriella rufa*	Göz et al. 2015
168	FALCONIFORMES	Falconidae	*Falco naumanni*	*Laemobothrion tinnunculi*	Göz et al. 2015
169	FALCONIFORMES	Falconidae	*Falco peregrinus*	-	Dik et al. 2017a
170	FALCONIFORMES	Falconidae	*Falco subbuteo*	-	Dik 2010
171	FALCONIFORMES	Falconidae	*Falco tinnunculus*	*Degeeriella rufa*	Dik et al. 2013c
172	FALCONIFORMES	Falconidae	*Falco tinnunculus*	*Colpocephalum subzerafae*	Esatgil et al. 2012
173	FALCONIFORMES	Falconidae	*Falco tinnunculus*	*Laemobothrion tinnunculi*	Esatgil et al. 2012
174	FALCONIFORMES	Falconidae	*Falco tinnunculus*	*Degeeriella sp.*	Girişgin et al. 2022
175	GALLIFORMES	Phasianidae	*Alectoris chukar*	*Goniodes dispar*	Aksın 2003
176	GALLIFORMES	Phasianidae	*Alectoris chukar*	*Menacanthus lyali*	Aksın 2003

Appendix 1. (continued)

	Order	Family	Host species	Louse species	Source
177	GALLIFORMES	Phasianidae	*Alectoris chukar*	*Cuclotogaster sp.*	Dik et al. 2015
178	GALLIFORMES	Phasianidae	*Alectoris chukar*	*Goniocotes pusillus*	Dik et al. 2015
179	GALLIFORMES	Phasianidae	*Alectoris chukar*	*Cuclotogaster heterographus*	Girişgin et al. 2013
180	GALLIFORMES	Phasianidae	*Coturnix coturnix*	*Cuculogaster cinereus*	Aksın 2010
181	GALLIFORMES	Phasianidae	*Coturnix coturnix*	*Goniodes astrocephalus*	Aksın 2010
182	GALLIFORMES	Phasianidae	*Coturnix coturnix*	*Menacanthus abdominalis*	Aksın 2010
183	GALLIFORMES	Phasianidae	*Phasianus colchicus*	*Lipeurus caponis*	Dik et al. 2017a
184	GRUIFORMES	Rallidae	*Crex crex*	*Rallicola ortygometrae*	Dik et al. 2017a
185	GRUIFORMES	Rallidae	*Fulica atra*	*Fulicoffula lurida*	Dik et al. 2011b
186	GRUIFORMES	Rallidae	*Fulica atra*	*Incidifrons fulica*	Dik et al. 2011b
187	GRUIFORMES	Rallidae	*Fulica atra*	*Pseudomenopon pilosum*	Dik et al. 2011b
188	GRUIFORMES	Rallidae	*Fulica atra*	*Rallicola fulica*	Dik et al. 2011b
189	GRUIFORMES	Rallidae	*Fulica atra*	*Laemobothrion atrum*	Dik et al. 2017b
190	GRUIFORMES	Rallidae	*Gallinula chloropus*	*Pseudomenapon pilosum*	Dik et al. 2017b
191	GRUIFORMES	Rallidae	*Gallinula chloropus*	*Rallicola minutus*	Dik et al. 2017b
192	GRUIFORMES	Rallidae	*Gallinula chloropus*	*Fulicoffula gallinula*	Girişgin et al. 2022
193	GRUIFORMES	Rallidae	*Porphyrio porphyrio*	*Pseudomenopon concretum*	Açıcı et al. 2021
194	GRUIFORMES	Rallidae	*Porphyrio porphyrio*	*Rallicola lugens*	Açıcı et al. 2021
195	GRUIFORMES	Rallidae	*Rallus aquaticus*	*Pseudomenopon scopulacorne*	Dik et al. 2011a
196	GRUIFORMES	Rallidae	*Zapornia parva*	*Pseudomenopon scopulacorne*	Dik et al. 2011a
197	OTIDIFORMES	Otididae	*Chlamydotis macqueenii*	-	Dik et al. 2015
198	PASSERIFORMES	Acrocephalidae	*Acrocephalus arrundinaceus*	-	Dik et al. 2011c

Appendix 1. (continued)

	Order	Family	Host species	Louse species	Source
199	PASSERIFORMES	Acrocephalidae	*Acrocephalus melanopogon*	-	Dik et al. 2011a
200	PASSERIFORMES	Acrocephalidae	*Acrocephalus palustris*	*Philopterus mirificus*	Açıcı et al. 2021
201	PASSERIFORMES	Acrocephalidae	*Acrocephalus palustris*	*Sturnidoecus pflergi*	Açıcı et al. 2021
202	PASSERIFORMES	Acrocephalidae	*Acrocephalus schoenobaenus*	-	Dik et al. 2011c
203	PASSERIFORMES	Acrocephalidae	*Acrocephalus scirpaceus*	*Menacanthus curuccae*	Açıcı et al. 2011
204	PASSERIFORMES	Acrocephalidae	*Hippolais icterina*	-	Dik et al. 2017a
205	PASSERIFORMES	Acrocephalidae	*Iduna pallida*	*Menacanthus curuccae*	Dik et al. 2017a
206	PASSERIFORMES	Aegithalidae	*Aegithalos caudatus*	-	Açıcı et al. 2011
207	PASSERIFORMES	Alaudidae	*Melanocorypha calandra*	*Menacanthus alaudae*	Dik et al. 2011a
208	PASSERIFORMES	Alaudidae	*Melanocorypha calandra*	*Menacanthus pusillus*	Dik et al. 2011c
209	PASSERIFORMES	Certhiidae	*Certhia brachydactyla*	-	Dik et al. 2013b
210	PASSERIFORMES	Certhiidae	*Certhia familiaris*	-	Dik et al. 2013b
211	PASSERIFORMES	Cettiidae	*Cettia cetti*	*Penenirmus longuliceps*	Dik et al. 2015
212	PASSERIFORMES	Corvidae	*Coloeus monedula*	-	Girişgin et al. 2013
213	PASSERIFORMES	Corvidae	*Corvus corax*	*Menacanthus gonophaeus*	Açıcı et al. 2021
214	PASSERIFORMES	Corvidae	*Corvus cornix*	-	Dik 2010
215	PASSERIFORMES	Corvidae	*Corvus frugilegus*	*Menacanthus gonophaeus*	Eren et al. 2022
216	PASSERIFORMES	Corvidae	*Corvus frugilegus*	*Philopterus atratus*	Eren et al. 2022
217	PASSERIFORMES	Corvidae	*Corvus frugilegus*	*Brueelia tasniemae*	Girişgin et al. 2022
218	PASSERIFORMES	Corvidae	*Corvus frugilegus*	*Myrsidea isostoma*	Girişgin et al. 2022
219	PASSERIFORMES	Corvidae	*Garrulus glandarius*	-	Girişgin et al. 2022
220	PASSERIFORMES	Corvidae	*Pica pica*	*Menacanthus eurysternus*	Dik et al. 2011a

Appendix 1. (continued)

	Order	Family	Host species	Louse species	Source
221	PASSERIFORMES	Corvidae	*Pica pica*	*Myrsidea picae*	Dik et al. 2011a
222	PASSERIFORMES	Corvidae	*Pica pica*	*Brueelia biocellata*	Dik et al. 2013a
223	PASSERIFORMES	Emberizidae	*Emberiza calandra*	-	Dik et al. 2011a
224	PASSERIFORMES	Emberizidae	*Emberiza cirlus*	-	Dik et al. 2013b
225	PASSERIFORMES	Emberizidae	*Emberiza citrinella*	-	Dik et al. 2017a
226	PASSERIFORMES	Emberizidae	*Emberiza hortulana*	-	Dik et al. 2017a
227	PASSERIFORMES	Emberizidae	*Emberiza melanocephala*	*Brueelia sp.*	Dik et al. 2015
228	PASSERIFORMES	Emberizidae	*Emberiza melanocephala*	*Penenirmus sp.*	Dik et al. 2015
229	PASSERIFORMES	Emberizidae	*Emberiza schoeniclus*	*Menacanthus chrysophaeus*	Dik et al. 2011c
230	PASSERIFORMES	Fringillidae	*Carduelis carduelis*	-	Dik et al. 2011b
231	PASSERIFORMES	Fringillidae	*Coccothraustes coccothraustes*	*Philopterus eurasiaticus*	Açıcı et al. 2021
232	PASSERIFORMES	Fringillidae	*Fringilla coelebs*	*Ricinus fringillae*	Açıcı et al. 2011
233	PASSERIFORMES	Fringillidae	*Fringilla montifringilla*	*Philopterus rapax*	Dik et al. 2017a
234	PASSERIFORMES	Fringillidae	*Linaria cannabina*	-	Dik et al. 2013c
235	PASSERIFORMES	Fringillidae	*Loxia curvirostra*	-	Dik et al. 2011b
236	PASSERIFORMES	Fringillidae	*Serinus serinus*	-	Dik et al. 2013b
237	PASSERIFORMES	Fringillidae	*Spinus spinus*	-	Dik et al. 2017a
238	PASSERIFORMES	Hirundinidae	*Delichon urbicum*	-	Dik 2010
239	PASSERIFORMES	Hirundinidae	*Hirundo rustica*	*Brueelia domestica*	Açıcı et al. 2011
240	PASSERIFORMES	Hirundinidae	*Hirundo rustica*	*Myrsidea rustica*	Açıcı et al. 2011
241	PASSERIFORMES	Hirundinidae	*Hirundo rustica*	*Menacanthus sp.*	Dik et al. 2015
242	PASSERIFORMES	Hirundinidae	*Riparia riparia*	*Myrsidea sp.*	Dik et al. 2017a

Appendix 1. (continued)

	Order	Family	Host species	Louse species	Source
243	PASSERIFORMES	Laniidae	*Lanius collurio*	*Menacanthus camelinus*	Açıcı et al. 2011
244	PASSERIFORMES	Laniidae	*Lanius collurio*	*Brueelia cruciata*	Dik et al. 2011c
245	PASSERIFORMES	Laniidae	*Lanius collurio*	*Menacanthus sp.*	Eren et al. 2022
246	PASSERIFORMES	Locustellidae	*Locustella fluviatilis*	-	Dik et al. 2015
247	PASSERIFORMES	Locustellidae	*Locustella luscinioides*	-	Açıcı et al. 2011
248	PASSERIFORMES	Locustellidae	*Locustella luscinioides*	*Brueelia locustellae*	Açıcı et al. 2021
249	PASSERIFORMES	Motacillidae	*Anthus campestris*	-	Dik et al. 2017a
250	PASSERIFORMES	Motacillidae	*Anthus spinoletta*	*Menacanthus pusillus*	Dik et al. 2011a
251	PASSERIFORMES	Motacillidae	*Anthus trivialis*	-	Dik et al. 2017a
252	PASSERIFORMES	Motacillidae	*Motacilla alba*	-	Açıcı et al. 2011
253	PASSERIFORMES	Motacillidae	*Motacilla citreola*	-	Dik et al. 2011c
254	PASSERIFORMES	Motacillidae	*Motacilla flava*	*Menacanthus pusillus*	Dik et al. 2011c
255	PASSERIFORMES	Motacillidae	*Motacilla flava*	*Menacanthus sp.*	Dik et al. 2017a
256	PASSERIFORMES	Muscicapidae	*Erithacus rubecula*	*Menacanthus eurysternus*	Dik et al. 2011a
257	PASSERIFORMES	Muscicapidae	*Erithacus rubecula*	*Menacanthus sp.*	Dik et al. 2015
258	PASSERIFORMES	Muscicapidae	*Ficedula albicollis*	*Brueelia sp.*	Dik et al. 2017a
259	PASSERIFORMES	Muscicapidae	*Ficedula hypoleuca*	-	Açıcı et al. 2011
260	PASSERIFORMES	Muscicapidae	*Ficedula parva*	-	Açıcı et al. 2011
261	PASSERIFORMES	Muscicapidae	*Ficedula semitorquata*	-	Dik et al. 2017a
262	PASSERIFORMES	Muscicapidae	*Luscinia luscinia*	*Brueelia lais*	Açıcı et al. 2021
263	PASSERIFORMES	Muscicapidae	*Luscinia luscinia*	*Menacanthus curuccae*	Dik et al. 2017a
264	PASSERIFORMES	Muscicapidae	*Luscinia megarhynchos*	*Brueelia lais*	Açıcı et al. 2021

Appendix 1. (continued)

	Order	Family	Host species	Louse species	Source
265	PASSERIFORMES	Muscicapidae	*Luscinia svecica*	-	Dik et al. 2011a
266	PASSERIFORMES	Muscicapidae	*Muscicapa striata*	*Penenirmus sp.*	Dik et al. 2017a
267	PASSERIFORMES	Muscicapidae	*Muscicapa striata*	*Philopterus desertus*	Dik et al. 2017a
268	PASSERIFORMES	Muscicapidae	*Oenanthe hispanica*	-	Dik et al. 2013b
269	PASSERIFORMES	Muscicapidae	*Oenanthe oenanthe*	-	Dik et al. 2017a
270	PASSERIFORMES	Muscicapidae	*Phoenicurus ochruros*	-	Dik et al. 2017a
271	PASSERIFORMES	Muscicapidae	*Phoenicurus phoenicurus*	*Penenirmus silvicultrix*	Dik et al. 2015
272	PASSERIFORMES	Muscicapidae	*Saxicola maura*	-	Dik et al. 2011c
273	PASSERIFORMES	Muscicapidae	*Saxicola rubetra*	-	Dik et al. 2017a
274	PASSERIFORMES	Muscicapidae	*Saxicola rubicola*	-	Dik et al. 2017a
275	PASSERIFORMES	Oriolidae	*Oriolus oriolus*	*Brueelia munda*	Dik et al. 2013c
276	PASSERIFORMES	Oriolidae	*Oriolus oriolus*	*Menacanthus orioli*	Dik et al. 2013c
277	PASSERIFORMES	Oriolidae	*Oriolus oriolus*	*Maculinirmus mundus*	Dik et al. 2017a
278	PASSERIFORMES	Oriolidae	*Oriolus oriolus*	*Ricinus dolicocephalus*	Dik et al. 2017a
279	PASSERIFORMES	Paridae	*Cyanistes caeruleus*	-	Dik et al. 2011b
280	PASSERIFORMES	Paridae	*Parus major*	-	Dik et al. 2011c
281	PASSERIFORMES	Paridae	*Periparus ater*	-	Dik et al. 2013b
282	PASSERIFORMES	Paridae	*Poecile lugubris*	-	Dik et al. 2013b
283	PASSERIFORMES	Paridae	*Poecile palustris*	-	Dik et al. 2013b
284	PASSERIFORMES	Passeridae	*Passer domesticus*	*Menacanthus eurysternus*	Dik et al. 2013c
285	PASSERIFORMES	Passeridae	*Passer domesticus*	*Philopterus fringillae*	Dik et al. 2013c
286	PASSERIFORMES	Passeridae	*Passer hispaniolensis*	-	Açıcı et al. 2011

Appendix 1. (continued)

	Order	Family	Host species	Louse species	Source
287	PASSERIFORMES	Passeridae	*Passer montanus*	-	Dik et al. 2011a
288	PASSERIFORMES	Phylloscopidae	*Phylloscopus collybita*	*Menacanthus curuccae*	Dik et al. 2011a
289	PASSERIFORMES	Phylloscopidae	*Phylloscopus collybita*	*Penenirmus rarus*	Dik et al. 2011c
290	PASSERIFORMES	Phylloscopidae	*Phylloscopus collybita*	*Menacanthus agilis*	Dik et al. 2015
291	PASSERIFORMES	Phylloscopidae	*Phylloscopus collybita*	*Menacanthus eurysternus*	Dik et al. 2017a
292	PASSERIFORMES	Phylloscopidae	*Phylloscopus sibilatrix*	-	Dik et al. 2013b
293	PASSERIFORMES	Phylloscopidae	*Phylloscopus sindianus*	-	Dik et al. 2011a
294	PASSERIFORMES	Phylloscopidae	*Phylloscopus trochilus*	*Brueelia sp.*	Dik et al. 2017a
295	PASSERIFORMES	Phylloscopidae	*Phylloscopus trochilus*	*Menacanthus agilis*	Dik et al. 2017a
296	PASSERIFORMES	Phylloscopidae	*Phylloscopus trochilus*	*Menacanthus eurysternus*	Dik et al. 2017a
297	PASSERIFORMES	Prunellidae	*Prunella modularis*	-	Açıcı et al. 2011
298	PASSERIFORMES	Regulidae	*Regulus ignicapilla*	-	Dik et al. 2017a
299	PASSERIFORMES	Regulidae	*Regulus regulus*	*Philopterus reguli*	Dik et al. 2017a
300	PASSERIFORMES	Regulidae	*Regulus regulus*	*Ricinus frenatus*	Dik et al. 2017a
301	PASSERIFORMES	Sittidae	*Sitta krueperi*	*Philopterus sittae*	Dik et al. 2013b
302	PASSERIFORMES	Sturnidae	*Sturnus vulgaris*	*Brueelia nebulosa*	Dik et al. 2009
303	PASSERIFORMES	Sturnidae	*Sturnus vulgaris*	*Brueelia sp.*	Dik et al. 2009
304	PASSERIFORMES	Sturnidae	*Sturnus vulgaris*	*Myrsidea cucullaris*	Dik et al. 2009
305	PASSERIFORMES	Sturnidae	*Sturnus vulgaris*	*Sturnidoecus sturni*	Dik et al. 2009
306	PASSERIFORMES	Sturnidae	*Sturnus vulgaris*	*Menacanthus eurysternus*	Dik et al. 2013c
307	PASSERIFORMES	Sylviidae	*Sylvia atricapilla*	*Menacanthus sp.*	Dik et al. 2015
308	PASSERIFORMES	Sylviidae	*Sylvia atricapilla*	*Menacanthus curuccae*	Dik et al. 2017a

Appendix 1. (continued)

	Order	Family	Host species	Louse species	Source
309	PASSERIFORMES	Sylviidae	*Sylvia borin*	*Menacanthus curuccae*	Açıcı et al. 2011
310	PASSERIFORMES	Sylviidae	*Sylvia borin*	*Penenirmus affectator*	Açıcı et al. 2011
311	PASSERIFORMES	Sylviidae	*Sylvia borin*	*Myrsidea sp.*	Dik et al. 2015
312	PASSERIFORMES	Sylviidae	*Curruca communis*	*Myrsidea sp.*	Dik et al. 2015
313	PASSERIFORMES	Sylviidae	*Curruca communis*	*Menacanthus curuccae*	Dik et al. 2017a
314	PASSERIFORMES	Sylviidae	*Curruca curruca*	-	Açıcı et al. 2011
315	PASSERIFORMES	Sylviidae	*Curruca melanocephala*	*Penenirmus sp.*	Açıcı et al. 2011
316	PASSERIFORMES	Sylviidae	*Curruca melanocephala*	*Menacanthus sp.*	Dik et al. 2015
317	PASSERIFORMES	Sylviidae	*Curruca nisoria*	*Myrsidea sp.*	Dik et al. 2015
318	PASSERIFORMES	Sylviidae	*Curruca nisoria*	*Penenirmus pikulai*	Dik et al. 2015
319	PASSERIFORMES	Sylviidae	*Curruca nisoria*	*Menacanthus curuccae*	Dik et al. 2017a
320	PASSERIFORMES	Troglodytidae	*Troglodytes troglodytes*	-	Dik et al. 2011a
321	PASSERIFORMES	Turdidae	*Turdus iliacus*	*Brueelia iliaci*	Dik et al. 2015
322	PASSERIFORMES	Turdidae	*Turdus iliacus*	*Ricinus elongatus*	Dik et al. 2017a
323	PASSERIFORMES	Turdidae	*Turdus merula*	*Brueelia merulensis*	Açıcı et al. 2011
324	PASSERIFORMES	Turdidae	*Turdus merula*	*Menacanthus eurysternus*	Açıcı et al. 2011
325	PASSERIFORMES	Turdidae	*Turdus merula*	*Ricinus elongatus*	Dik & Dinçer 2012
326	PASSERIFORMES	Turdidae	*Turdus merula*	*Menacanthus sp.*	Dik et al. 2011a
327	PASSERIFORMES	Turdidae	*Turdus merula*	*Brueelia jacobi*	Dik et al. 2013b
328	PASSERIFORMES	Turdidae	*Turdus merula*	*Philopterus sp.*	Dik et al. 2013b
329	PASSERIFORMES	Turdidae	*Turdus philomelos*	*Brueelia turdinulae*	Açıcı et al. 2011
330	PASSERIFORMES	Turdidae	*Turdus philomelos*	*Menacanthus eurysternus*	Dik et al. 2015

Appendix 1. (continued)

	Order	Family	Host species	Louse species	Source
331	PASSERIFORMES	Turdidae	*Turdus philomelos*	*Brueelia marginata*	Dik et al. 2017a
332	PASSERIFORMES	Turdidae	*Turdus viscivorus*	*Philopterus vernus*	Dik et al. 2013b
333	PELECANIFORMES	Ardeidae	*Ardea alba*	*Comatomenapon elongatum*	Inci et al. 2010
334	PELECANIFORMES	Ardeidae	*Ardea cinerea*	*Ciconiphilus decimfasciatus*	Eren et al. 2022
335	PELECANIFORMES	Ardeidae	*Botaurus stellaris*	-	Dik 2010
336	PELECANIFORMES	Ardeidae	*Egretta garzetta*	*Ciconiphilus decimfasciatus*	Eren et al. 2022
337	PELECANIFORMES	Ardeidae	*Ixobrychus minutus*	*Ardeicola celeris*	Dik et al. 2017a
338	PELECANIFORMES	Ardeidae	*Ixobrychus minutus*	*Ardeicola ixobrychae*	Girişgin et al. 2022
339	PELECANIFORMES	Pelecanidae	*Pelecanus crispus*	*Piagetiella titan*	Dik & Uslu 2006a
340	PELECANIFORMES	Pelecanidae	*Pelecanus crispus*	*Pectinopygus bifasciatus*	Dik et al. 2017b
341	PELECANIFORMES	Pelecanidae	*Pelecanus crispus*	*Pectinopygus sp.*	Girişgin et al. 2013
342	PELECANIFORMES	Pelecanidae	*Pelecanus onocrotalus*	*Colpocephalum eucarenum*	Dik & Uslu 2008
343	PELECANIFORMES	Pelecanidae	*Pelecanus onocrotalus*	*Pectinopygus forficulatus*	Dik & Uslu 2008
344	PELECANIFORMES	Pelecanidae	*Pelecanus onocrotalus*	*Piagetiella titan*	Dik et al. 2013c
345	PELECANIFORMES	Pelecanidae	*Pelecanus onocrotalus*	*Pectinopygus sp.*	Girişgin et al. 2013
346	PELECANIFORMES	Threskiornithidae	*Platalea leucorodia*	*Ardeicola plataleae*	Girişgin et al. 2013
347	PELECANIFORMES	Threskiornithidae	*Platalea leucorodia*	*Ibidoecus plataleaea*	Girişgin et al. 2013
348	PHOENICOPTERIFORMES	Phoenicopteridae	*Phoenicopterus roseus*	*Anaticola phoenicopteri*	Dik et al. 2011b
349	PHOENICOPTERIFORMES	Phoenicopteridae	*Phoenicopterus roseus*	*Anatoecus pygaspis*	Dik et al. 2011b
350	PHOENICOPTERIFORMES	Phoenicopteridae	*Phoenicopterus roseus*	*Colpocephalum heterosoma*	Dik et al. 2011b
351	PHOENICOPTERIFORMES	Phoenicopteridae	*Phoenicopterus roseus*	*Trinoton femoratum*	Dik et al. 2011b
352	PICIFORMES	Picidae	*Dendrocopos syriacus*	-	Girişgin et al. 2022

Appendix 1. (continued)

	Order	Family	Host species	Louse species	Source
353	PICIFORMES	Picidae	*Jynx torquilla*	*Penenirmus serrilimbus*	Dik et al. 2017a
354	PODICIPEDIFORMES	Podicipedidae	*Podiceps cristatus*	*Aquanirmus podicepis*	Dik et al. 2017b
355	PODICIPEDIFORMES	Podicipedidae	*Podiceps cristatus*	*Pseudomenopon dolium*	Dik et al. 2017b
356	PODICIPEDIFORMES	Podicipedidae	*Tachybaptus ruficollis*	-	Açıcı et al. 2011
357	STRIGIFORMES	Strigidae	*Asio otus*	*Strigiphilus barbatus*	Dik 2010
358	STRIGIFORMES	Strigidae	*Asio otus*	*Columbicola columbae*	Dik et al. 2013c
359	STRIGIFORMES	Strigidae	*Athene noctua*	*Strigiphilus cursitans*	Girişgin et al. 2013
360	STRIGIFORMES	Strigidae	*Bubo bubo*	*Strigiphilus strigis*	Dik & Uslu 2007
361	STRIGIFORMES	Strigidae	*Bubo bubo*	*Kurodaia longipes*	Dik et al. 2015
362	STRIGIFORMES	Strigidae	*Otus scops*	-	Dik et al. 2017a
363	STRIGIFORMES	Strigidae	*Strix aluco*	-	Dik et al. 2015
364	STRIGIFORMES	Tytonidae	*Tyto alba*	*Kurodaia subpachygaster*	Eren et al. 2022
365	STRIGIFORMES	Tytonidae	*Tyto alba*	*Colpocephalum sp.*	Girişgin et al. 2022
366	SULIFORMES	Phalacrocoracidae	*Gulosus aristotelis*	*Eidmanniella pellucida*	Karatepe et al. 2017
367	SULIFORMES	Phalacrocoracidae	*Gulosus aristotelis*	*Pectinopygus brevicornis*	Karatepe et al. 2017
368	SULIFORMES	Phalacrocoracidae	*Phalacrocorax carbo*	*Eidmanniella pellucida*	Açıcı et al. 2021
369	SULIFORMES	Phalacrocoracidae	*Phalacrocorax carbo*	*Pectinopygus excornis*	Açıcı et al. 2021